Climate Change and Human Health Literature Portal

![National Institute of Environmental Health Sciences]

Past trends and future scenarios for environmental conditions favoring the accumulation of paralytic shellfish toxins in Puget Sound shellfish

Author(s):	Moore SK, Mantua NJ, Salathe EP
Year:	2011
Journal:	Harmful Algae. 10 (5): 521-529

Abstract:

The risk of harmful algal blooms (HABs) of the dinoflagellate Alexandrium catenella in Puget Sound, Washington State, can be assessed by identifying and predicting climate and environmental conditions that are favorable for bloom development and the accumulation of paralytic shellfish toxins (PSTs) in shellfish. When these favorable conditions occur in combination, a harmful algal bloom window of opportunity (HAB-WOO) exists for A. catenella. The original HAB-WOO was identified by Moore et al. (2009) for the time period 1993-2007. In general, it showed that warm air and water temperatures, low streamflow, low winds, and small tidal variability precede PST events. Here, we use the HAB-WOO model to examine (i) changes in the annual HAB-WOO duration over the period from 1967 to 2006, and (ii) the potential effect of future climate change on HAB risk through the late 21st century. The annual HAB-WOO duration increased between 1978 and 2006, as did the frequency and geographic extent of PST events. Two step-like changes occurred in 1978 and 1992 with higher annual values attained by the HAB-WOO compared to previous years. The 1978 step change may be related to the 1977 reversal of the Pacific Decadal Oscillation from cool to warm phase. Climate change projections from global climate models and regionally downscaled climate models for the Pacific Northwest are used to evaluate scenarios for the future HAB-WOO. Under a moderate greenhouse gas emissions scenario (i.e., A1B), the annual HAB-WOO for A. catenella in Puget Sound is projected to increase by an average of 13 days by the end of the 21st century. Furthermore, the annual HAB-WOO may begin up to 2 months earlier in the year and persist for up to 1 month later in the year compared to the present day. This research provides managers, health authorities, and shellfish growers in Washington State with critical information for anticipating climate impacts on toxic HABs in the Pacific Northwest now and in a future warmer climate. (C) 2011 Elsevier B.V. All rights reserved.

Source: http://dx.doi.org/10.1016/j.hal.2011.04.004

Resource Description

Climate Scenario : ☒

specification of climate scenario (set of assumptions about future states related to climate)

 Special Report on Emissions Scenarios (SRES)

    Special Report on Emissions Scenarios (SRES) Scenario: SRES A1

Exposure : ☒

weather or climate related pathway by which climate change affects health

Food/Water Quality, Food/Water Quality, Precipitation, Temperature

Food/Water Quality: Biotoxin/Algal Bloom, Biotoxin/Algal Bloom, Other Water Quality Issue

Water Quality (other): Sea surface temperature; Nutrients; Salinity

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location: ☒

resource focuses on specific location

United States

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Morbidity/Mortality, Neurological Effect

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Other Projection Model/Methodology

Other Projection Model/Methodology: Harmful algal bloom windows of oppurtunity (HAB-WOOs)

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content